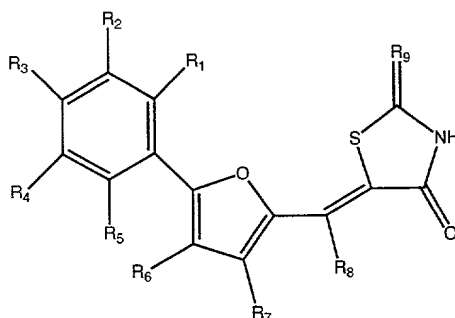


We claim:

1. A compound comprising the formula:



wherein

R_1 to R_8 each independently are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, heterocycle, COOH, COOalkyl, CONR₁₀R₁₁, C(O)R₁₂, OH, Oalkyl, OAc, SH, SR₁₂, SO₃H, S(O)R₁₂, SO₂NR₁₀R₁₁, S(O)₂R₁₂, NH₂, NHR₁₂, NR₁₀R₁₁, NHCOR₁₂, N₃, NO₂, PH₃, PH₂R₁₂, H₂PO₄, H₂PO₃, H₂PO₂, HPO₄R₁₂, PO₂R₁₁R₁₂, CN, and X;

R_9 is O, S, or NR₁₂; and

R_{10} , R_{11} , and R_{12} each independently are selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, and heterocycle, or R_{10} and R_{11} together with the nitrogen to which they are attached can be joined to form a heterocyclic ring;

with the proviso that at least one of R_1 to R_8 is other than hydrogen.

2. The compound of claim 1, wherein at least one of R_1 to R_8 is COOH.

5 3. The compound of claim 1, wherein at least one of R_1 to R_8 is OH.

4. The compound of claim 1, wherein at least one of R_1 to R_8 is OAlkyl.

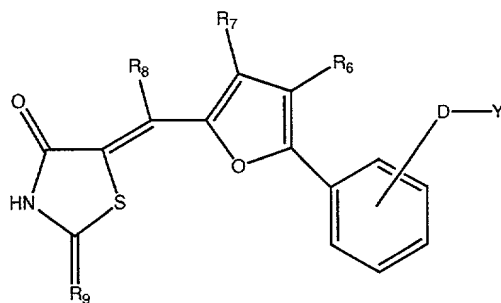
10 5. The compound of claim 1, wherein at least one of R_1 to R_8 is COOAlkyl.

6. The compound of claim 1, wherein at least one of R_1 to R_8 is NHCOR₇.

7. The compound of claim 1, wherein two or more of R_1 to R_8 are substituted.

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8. The compound of claim 1, having the formula

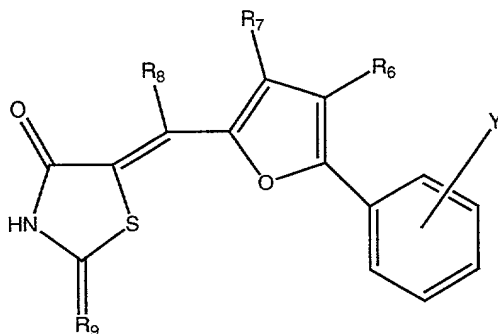


wherein

D is alkylene, alkenylene, alkynylene, aryl, or heterocycle; and

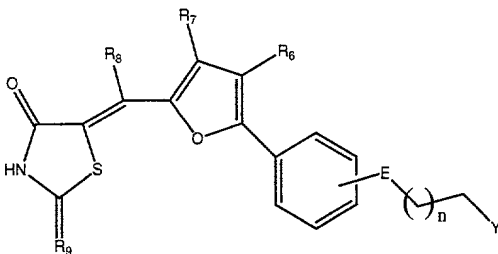
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

9. The compound of claim 1, having the formula



wherein Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

10. The compound of claim 1, having the formula



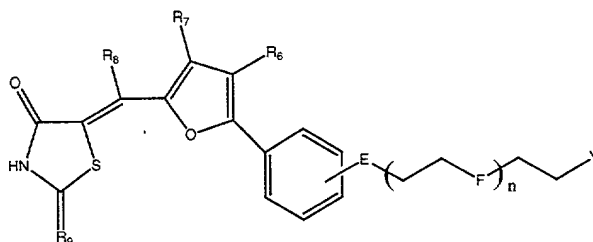
wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

11. The compound of claim 1, having the formula



5

wherein

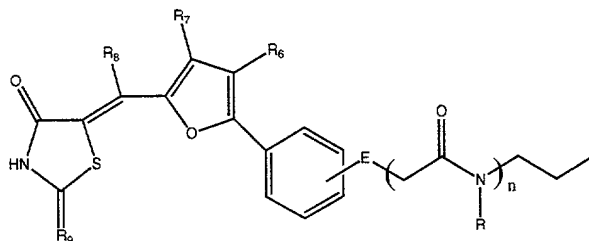
E and F each independently are selected from the group consisting of O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, and CH=CH;

10 Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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12. The compound of claim 1, having the formula



5 wherein

E is O, S, NH, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

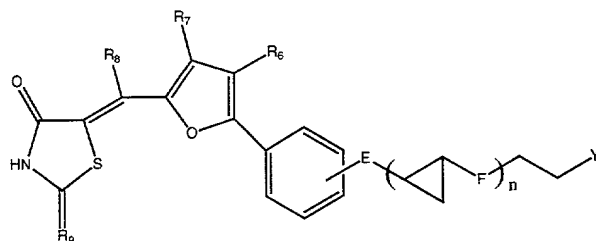
Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂;

10 R is hydrogen, alkyl, alkenyl, alkynyl, aryl, or
heterocycle; and

n is an integer between 0 and 5, inclusive.

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13. The compound of claim 1, having the formula



5

wherein

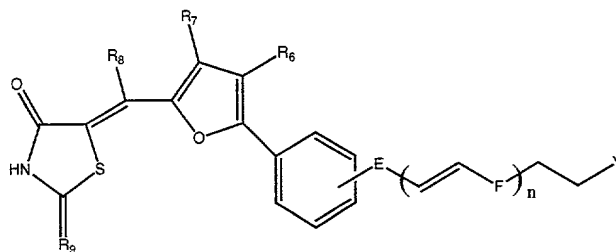
E and F each independently are selected from the group consisting of O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, and CH=CH;

10 Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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14. The compound of claim 1, having the formula



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wherein

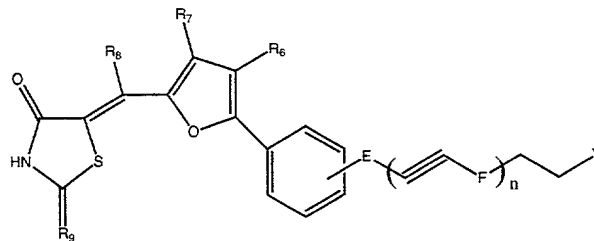
E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
NR₁₁CNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

10 F independently is selected from the group consisting of
O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO,
C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

15. The compound of claim 1, having the formula



5 wherein

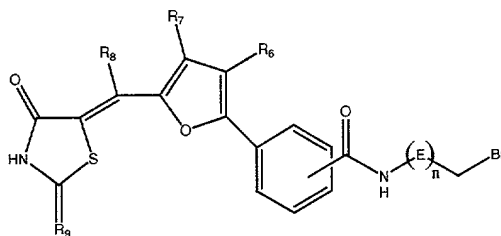
E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

10 F independently is selected from the group consisting of
O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO,
C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

16. The compound of claim 1, having the formula



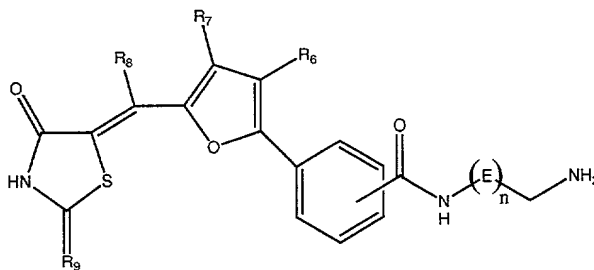
5

wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH; and

n is an integer between 0 and 5, inclusive.

- 10 17. The compound of claim 1, having the formula



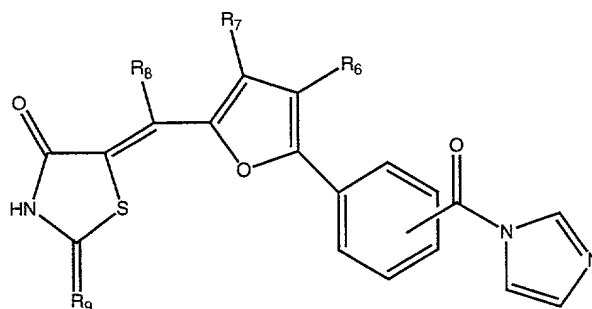
15 wherein

E is CH₂, CH₂CH₂OCH or CH₂CH₂SCH and n is an integer between 1 and 10, inclusive.

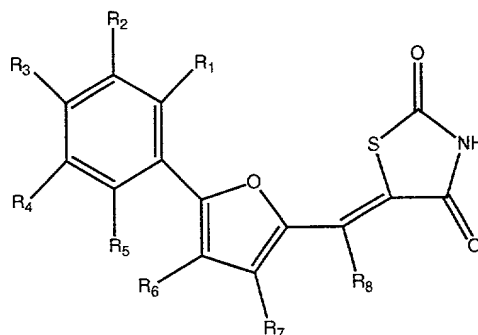
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18. The compound of claim 17, wherein n is greater than 4 and E is $\text{CH}_2\text{CH}_2\text{OCH}$ or $\text{CH}_2\text{CH}_2\text{SCH}$.

19. The compound of claim 1, having the formula



20. A compound comprising the formula:



5 wherein

R₁ to R₈ each independently are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, heterocycle, COOH, COOalkyl, CONR₁₀R₁₁, C(O)R₁₂, OH, Oalkyl, OAc, SH, SR₁₂, SO₃H, S(O)R₁₂, SO₂NR₁₀R₁₁, S(O)₂R₁₂,
 10 NH₂, NHR₁₂, NR₁₀R₁₁, NHCOR₁₂, N₃, NO₂, PH₃, PH₂R₁₂, H₂PO₄, H₂PO₃, H₂PO₂, HPO₄R₁₂, PO₂R₁₁R₁₂, CN, and X;

R₁₀, R₁₁, and R₁₂ each independently are selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, and heterocycle, or R₁₀ and R₁₁ together with the
 15 nitrogen to which they are attached can be joined to form a heterocyclic ring;

with the proviso that at least one of R₁ to R₈ is other than hydrogen.

21. The compound of claim 20, wherein at
 20 least one of R₁ to R₈ is COOH.

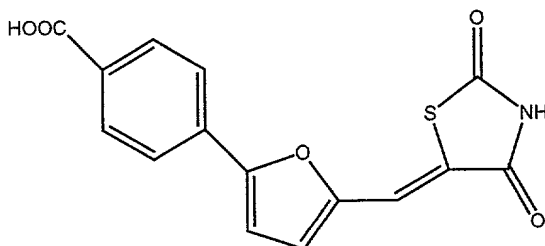
22. The compound of claim 20, wherein at least one of R_1 to R_8 is OH.

23. The compound of claim 20, wherein at least one of R_1 to R_8 is COOAlkyl.

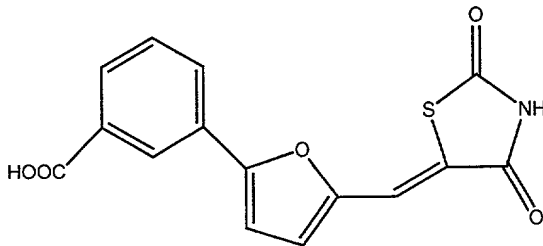
5 24. The compound of claim 20, wherein at least one of R_1 to R_8 is OAlkyl.

25. The compound of claim 20, wherein two or more of R_1 to R_8 are substituted.

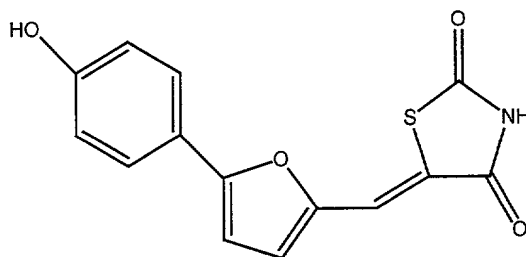
10 26. The compound of claim 20, having the formula:



15 27. The compound of claim 20, having the formula:

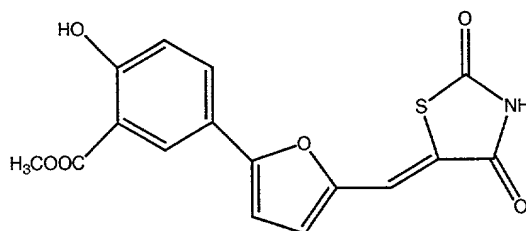


28. The compound of claim 20, having the formula:



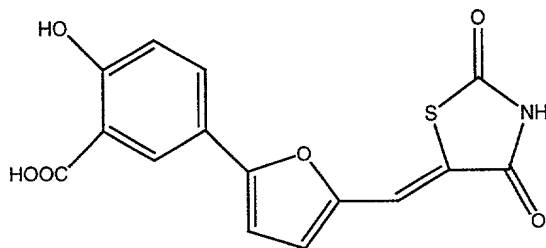
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29. The compound of claim 20, having the formula:



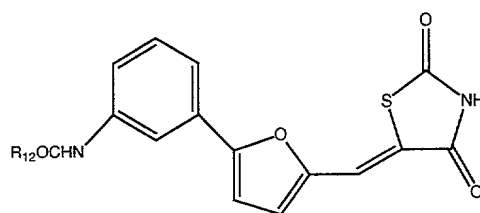
10

30. The compound of claim 20, having the formula:



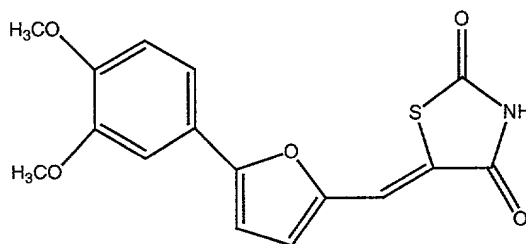
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31. The compound of claim 20, having the formula:



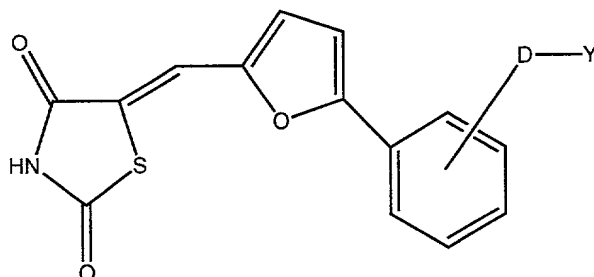
5

32. The compound of claim 20, having the formula:



10

33. The compound of claim 20, having the formula

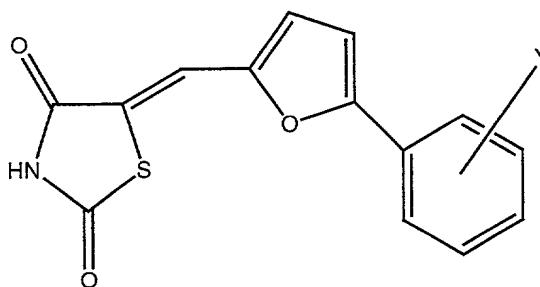


wherein

D is alkylene, alkenylene, alkynylene, aryl, or heterocycle; and

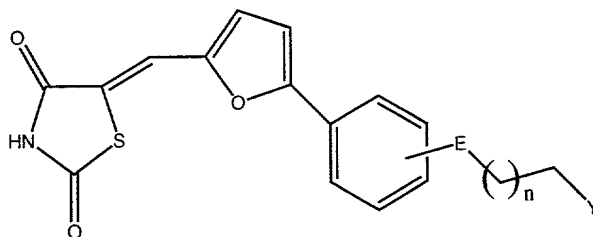
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

34. The compound of claim 20, having the formula



wherein Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

35. The compound of claim 20, having the formula



5

wherein

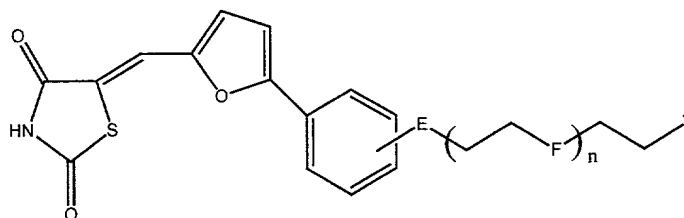
E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂; and

10

n is an integer between 0 and 5, inclusive.

36. The compound of claim 20, having the formula



5

wherein

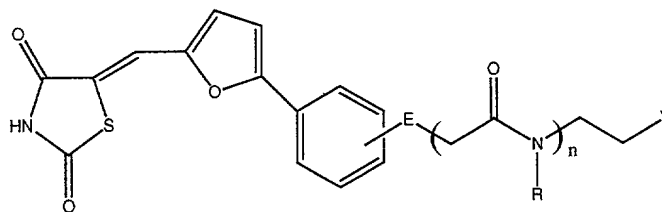
E and F each independently are selected from the group consisting of O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, and CH=CH;

10 Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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37. The compound of claim 20, having the formula



5

wherein

E is O, S, NR_{12} , $CR_{11}C_{12}$, $CONR_{12}$, SO_2NR_{12} , $NR_{11}CONR_{12}$, $NR_{11}CNHNR_{12}$, $NR_{12}COO$, $C\equiv C$, or $CH=CH$;

10

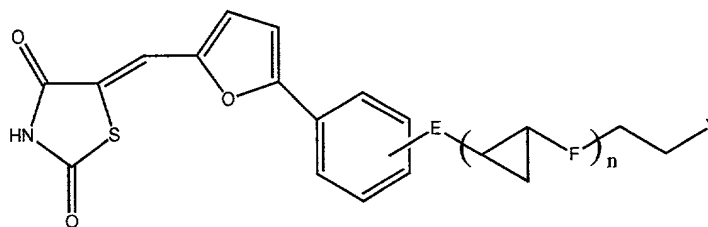
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , $CONH_2$, $CONHR_{12}$, $C\equiv CH$, or $CH=CH_2$;

R is hydrogen, alkyl, alkenyl, alkynyl, aryl, or heterocycle; and

n is an integer between 0 and 5, inclusive.

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38. The compound of claim 20, having the formula



5

wherein

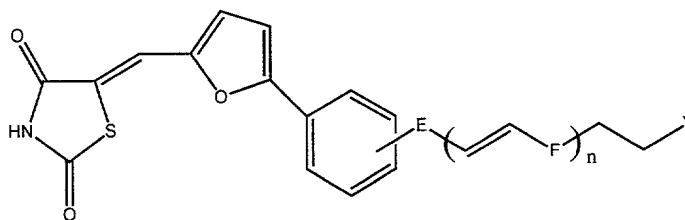
E and F each independently are selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, and $\text{CH}=\text{CH}$;

10 Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

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39. The compound of claim 20, having the formula



5

wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

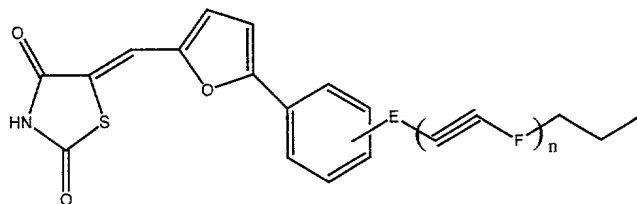
10 F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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40. The compound of claim 20, having the formula



5

wherein

E is O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, or $\text{CH}=\text{CH}$;

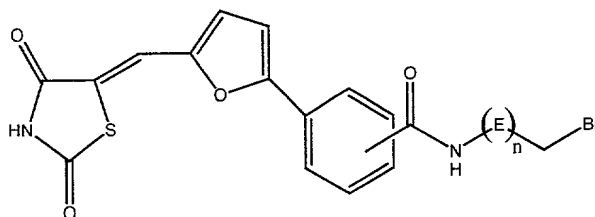
10 F independently is selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{R}_{12}$, CONR_{12} , $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}=\text{C}$, and $\text{CH}=\text{CH}$;

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

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41. The compound of claim 20, having the formula

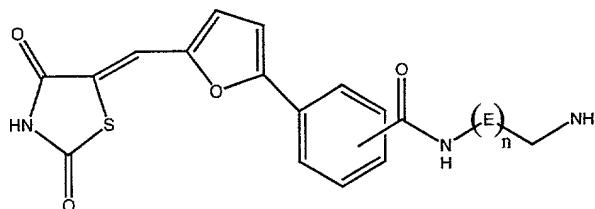


5 wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH; and

n is an integer between 0 and 5, inclusive.

42. The compound of claim 20, having the formula



wherein

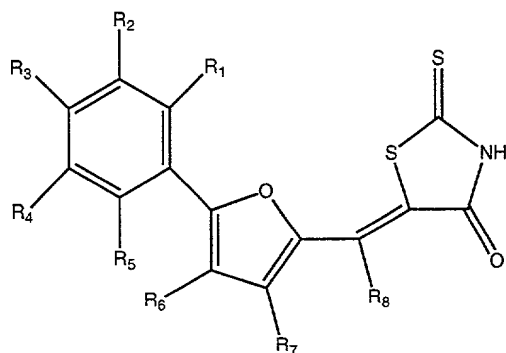
15 E is O, CH₂, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH; and

n is an integer between 0 and 5, inclusive.

5

O=C1NC(=O)C(S1)=Cc2cc(oc2-c3ccccc3C(=O)N4C=CC=C4)oc5ccccc5

45. A compound comprising the formula:



5

wherein

R₁ to R₈ each independently are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, heterocycle, COOH, COOalkyl, CONR₁₀R₁₁, C(O)R₁₂, OH, Oalkyl, OAc, SH, SR₁₂, SO₃H, S(O)R₁₂, SO₂NR₁₀R₁₁, S(O)₂R₁₂, NH₂, NHR₁₂, NR₁₀R₁₁, NHCOR₁₂, N₃, NO₂, PH₃, PH₂R₁₂, H₂PO₄, H₂PO₃, H₂PO₂, HPO₄R₁₂, PO₂R₁₁R₁₂, CN, and X;

R₁₀, R₁₁, and R₁₂ each independently are selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, and heterocycle, or R₁₀ and R₁₁ together with the nitrogen to which they are attached can be joined to form a heterocyclic ring;

with the proviso that at least one of R₁ to R₈ is other than hydrogen.

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46. The compound of claim 45, wherein at least one of R_1 to R_8 is COOH.

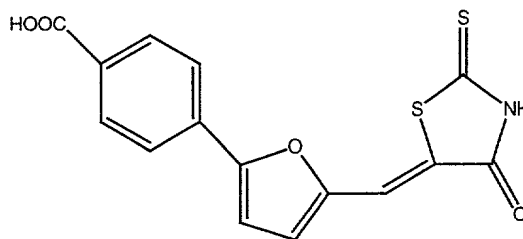
47. The compound of claim 45, wherein at least one of R_1 to R_8 is OH.

5 48. The compound of claim 45, wherein at least one of R_1 to R_8 is OAlkyl.

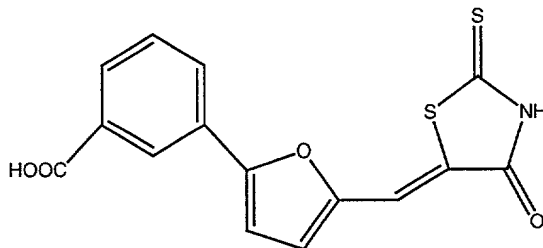
49. The compound of claim 45, wherein at least one of R_1 to R_8 is COOAlkyl.

10 50. The compound of claim 45, wherein at least one of R_1 to R_8 is NHAc.

51. The compound of claim 45, having the formula:

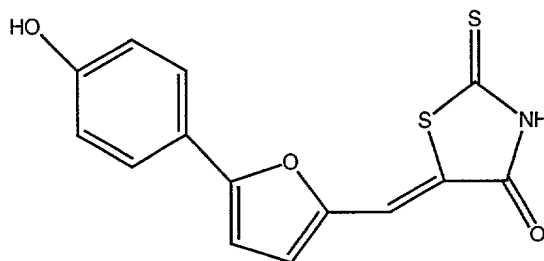


52. The compound of claim 45, having the formula:



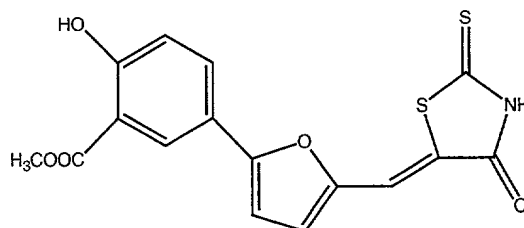
5

53. The compound of claim 45, having the formula:



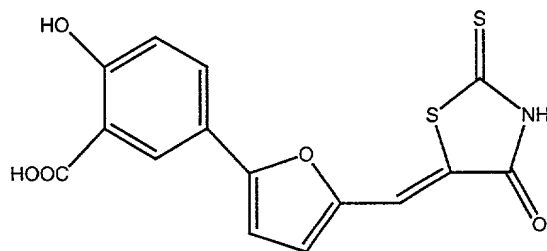
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54. The compound of claim 45, having the formula:



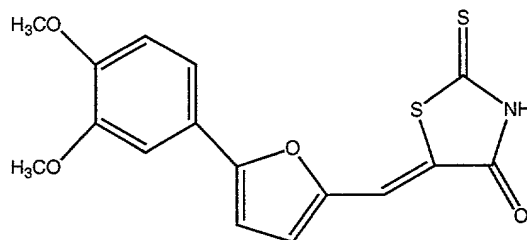
15

55. The compound of claim 45, having the formula:



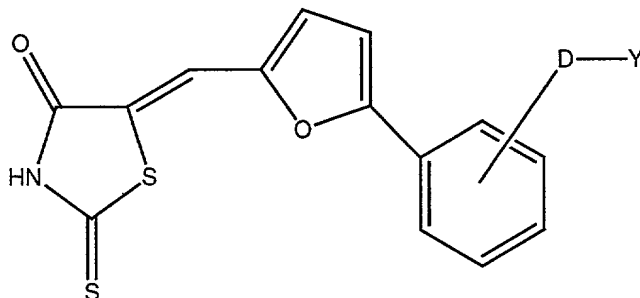
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56. The compound of claim 45, having the formula:



10

57. The compound of claim 45, having the formula

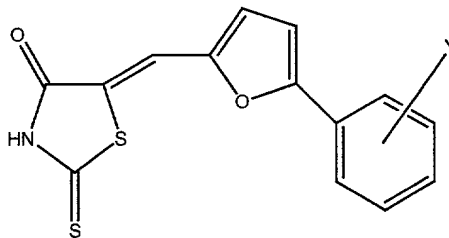


wherein

D is alkylene, alkenylene, alkynylene, aryl, or heterocycle; and

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

58. The compound of claim 45, having the formula

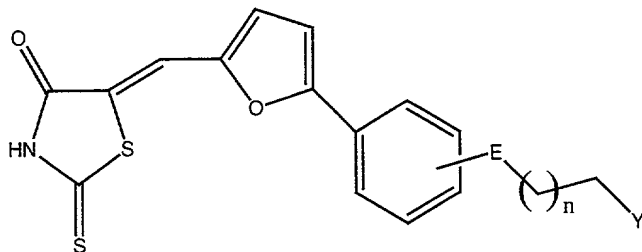


wherein

wherein Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

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59. The compound of claim 45, having the formula



5

wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

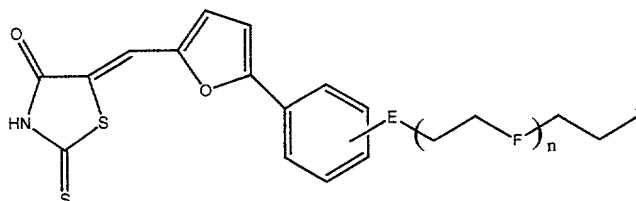
Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂; and

10

n is an integer between 0 and 5, inclusive.

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60. The compound of claim 45, having the formula



5

wherein

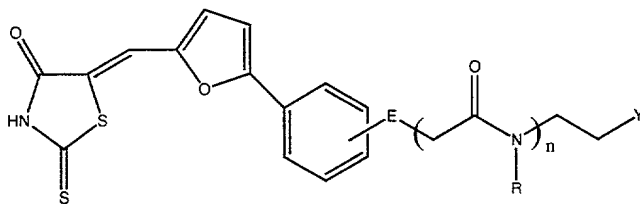
E and F each independently are selected from the group consisting of O, S, NR_{12} , $CR_{11}C_{12}$, $CONR_{12}$, SO_2NR_{12} , $NR_{11}CONR_{12}$, $NR_{11}CNHNR_{12}$, $NR_{12}COO$, $C\equiv C$, and $CH=CH$;

10 Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , $CONH_2$, $CONHR_{12}$, $C\equiv CH$, or $CH=CH_2$; and

n is an integer between 0 and 5, inclusive.

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61. The compound of claim 45, having the formula



5 wherein

E is O, S, NR_{12} , $CR_{11}C_{12}$, $CONR_{12}$, SO_2NR_{12} , $NR_{11}CONR_{12}$, $NR_{11}CNHNR_{12}$, $NR_{12}COO$, $C\equiv C$, or $CH=CH$;

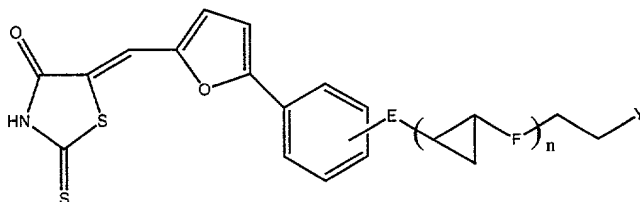
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , $CONH_2$, $CONHR_{12}$, $C\equiv CH$, or $CH=CH_2$;

10 R is hydrogen, alkyl, alkenyl, alkynyl, aryl, or heterocycle; and

n is an integer between 0 and 5, inclusive.

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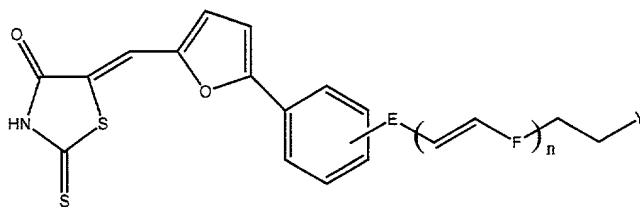


10

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

63. The compound of claim 45, having the formula



5 wherein

E is O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, or $\text{CH}=\text{CH}$;

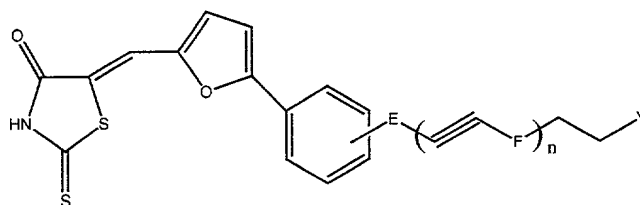
10 F independently is selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{R}_{12}$, CONR_{12} , $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}=\text{C}$, and $\text{CH}=\text{CH}$;

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

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5 wherein

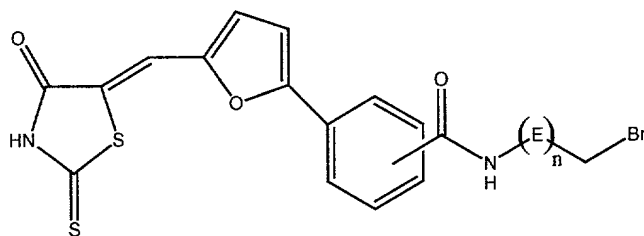


10

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

65. The compound of claim 45, having the formula

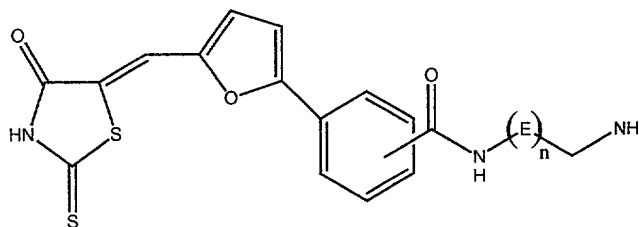


5 wherein

E is selected O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, or $\text{CH}=\text{CH}$; and

n is an integer between 0 and 5, inclusive.

66. The compound of claim 45, having the
10 formula



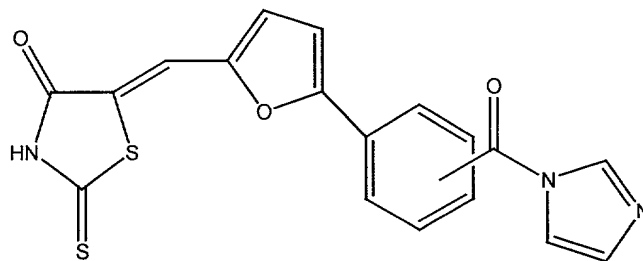
wherein

E is CH_2 , $\text{CH}_2\text{CH}_2\text{OCH}$ or $\text{CH}_2\text{CH}_2\text{SCH}$ and n is an integer
15 between 1 and 10, inclusive.

67. The compound of claim 66, wherein n is greater than 4 and E is $\text{CH}_2\text{CH}_2\text{OCH}$ or $\text{CH}_2\text{CH}_2\text{SCH}$.

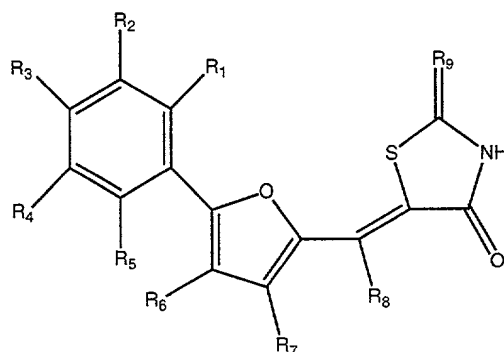
68. The compound of claim 45, having the formula

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69. A combinatorial library of two or more compounds comprising a common ligand variant of a compound of the formula:



wherein

R₁ to R₈ each independently are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, heterocycle, COOH, COOalkyl, CONR₁₀R₁₁, C(O)R₁₂, OH, Oalkyl, OAc, SH, SR₁₂, SO₃H, S(O)R₁₂, SO₂NR₁₀R₁₁, S(O)₂R₁₂, NH₂, NHR₁₂, NR₁₀R₁₁, NHCOR₁₂, N₃, NO₂, PH₃, PH₂R₁₂, H₂PO₄, H₂PO₃, H₂PO₂, HPO₄R₁₂, PO₂R₁₁R₁₂, CN, and X;

R₉ is O, S, or NR₁₂; and

R₁₀, R₁₁, and R₁₂ each independently are selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, and heterocycle, or R₁₀ and R₁₁ together with the nitrogen to which they are attached can be joined to form a heterocyclic ring.

70. The combinatorial library of claim 69, wherein at least one of R₁ to R₈ is COOH.

71. The combinatorial library of claim 69, wherein at least one of R_1 to R_8 is OH.

72. The combinatorial library of claim 69, wherein at least one of R_1 to R_8 is OAlkyl.

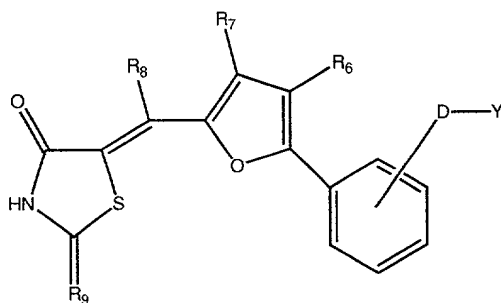
5 73. The combinatorial library of claim 69, wherein at least one of R_1 to R_8 is COOAlkyl.

74. The combinatorial library of claim 69, wherein at least one of R_1 to R_8 is NHCOR₇.

10 75. The combinatorial library of claim 69, wherein two or more of R_1 to R_5 are substituted.

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76. The combinatorial library of claim 69, having the formula

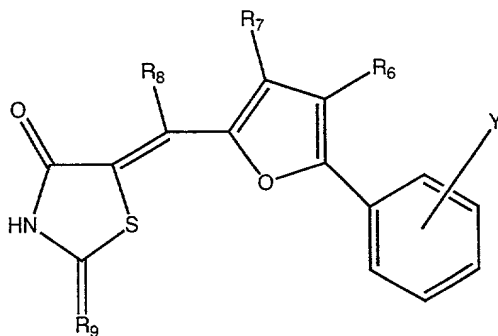


wherein

D is alkylene, alkenylene, alkynylene, aryl, or heterocycle; and

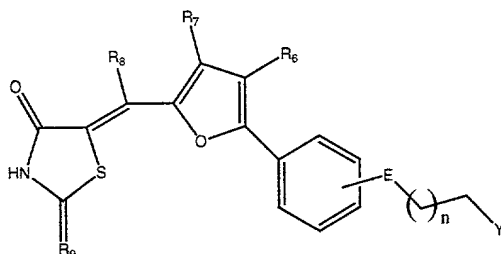
Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂.

77. The combinatorial library of claim 69, having the formula



wherein Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂.

78. The combinatorial library of claim 69, having the formula



5 wherein

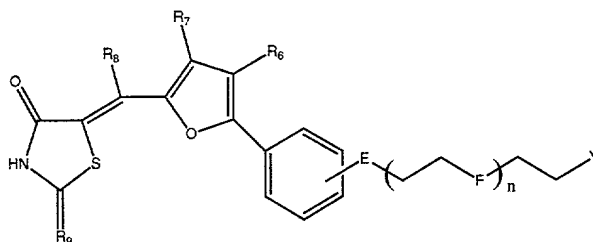
E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂; and

10 n is an integer between 0 and 5, inclusive.

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79. The combinatorial library of claim 69, having the formula



5

wherein

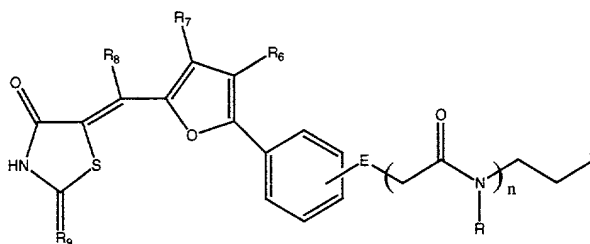
E and F each independently are selected from the group consisting of O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, and CH=CH;

10 Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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80. The combinatorial library of claim 69, having the formula



5

wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
NR₁₁CNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂;

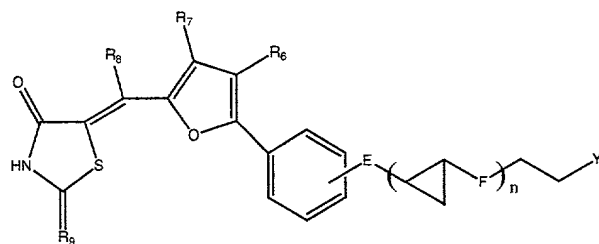
10

R is hydrogen, alkyl, alkenyl, alkynyl, aryl, or
heterocycle; and

n is an integer between 0 and 5, inclusive.

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81. The combinatorial library of claim 69, having the formula



5

wherein

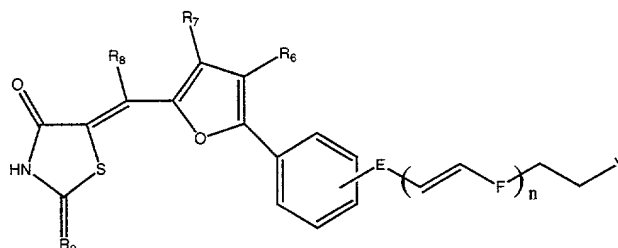
E and F each independently are selected from the group consisting of O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, and CH=CH;

10 Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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82. The combinatorial library of claim 69, having the formula



5 wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

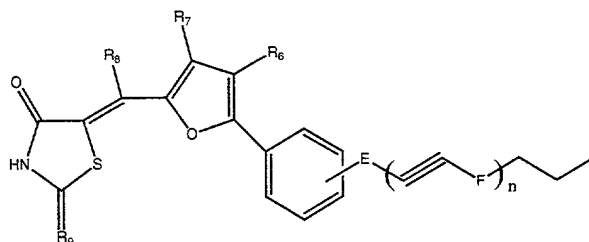
F independently is selected from the group consisting of
O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO,
10 C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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83. The combinatorial library of claim 69, having the formula



5

wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

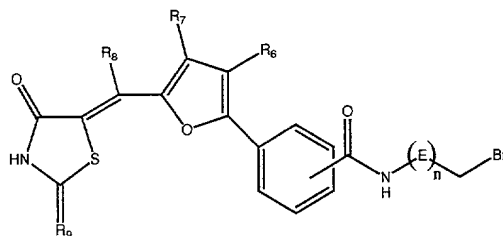
10 F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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84. The combinatorial library of claim 69, having the formula

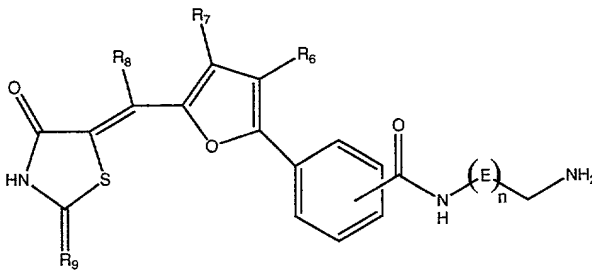


5 wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH; and

n is an integer between 0 and 5, inclusive.

85. The combinatorial library of claim 69, having the formula

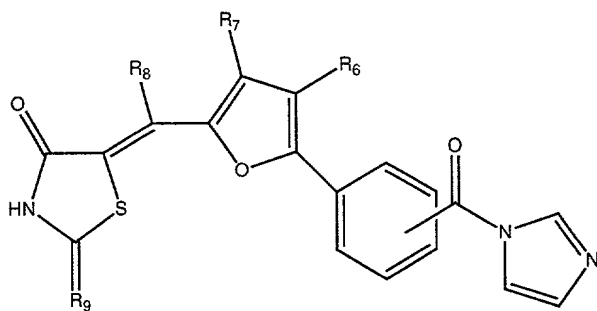


wherein

E is CH₂, CH₂CH₂OCH or CH₂CH₂SCH and n is an integer between 1 and 10, inclusive.

86. The combinatorial library of claim 85, wherein n is greater than 4 and E is CH₂CH₂OCH or CH₂CH₂SCH.

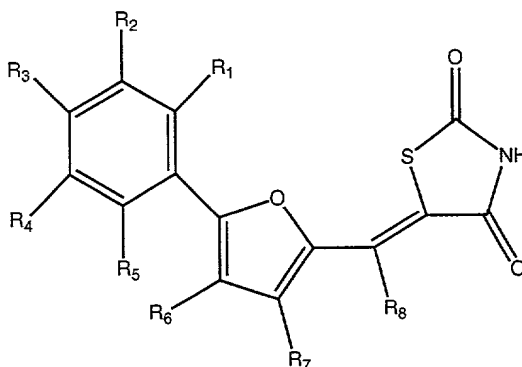
87. The combinatorial library of claim 69, having the formula



5

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88. A combinatorial library of two or more compounds comprising a common ligand variant of a compound of the formula:



wherein

R_1 to R_8 each independently are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, heterocycle, COOH, COOalkyl, CONR₁₀R₁₁, C(O)R₁₂, OH, Oalkyl, OAc, SH, SR₁₂, SO₃H, S(O)R₁₂, SO₂NR₁₀R₁₁, S(O)₂R₁₂, NH₂, NHR₁₂, NR₁₀R₁₁, NHCOR₁₂, N₃, NO₂, PH₃, PH₂R₁₂, H₂PO₄, H₂PO₃, H₂PO₂, HPO₄R₁₂, PO₂R₁₁R₁₂, CN, and X;

R_{10} , R_{11} , and R_{12} each independently are selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, and heterocycle, or R_{10} and R_{11} together with the nitrogen to which they are attached can be joined to form a heterocyclic ring.

89. The combinatorial library of claim 88, wherein at least one of R_1 to R_8 is COOH.

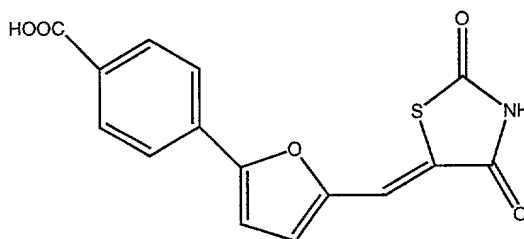
90. The combinatorial library of claim 88, wherein at least one of R_1 to R_8 is OH.

5 91. The combinatorial library of claim 88, wherein at least one of R_1 to R_8 is COOAlkyl.

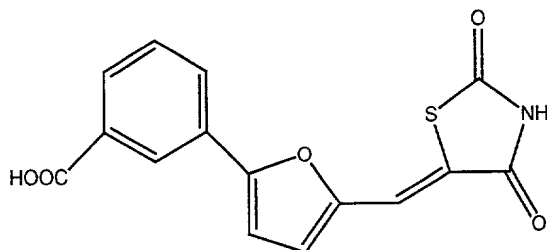
92. The combinatorial library of claim 88, wherein at least one of R_1 to R_8 is OAlkyl.

10 93. The combinatorial library of claim 88, wherein two or more of R_1 to R_8 are substituted.

94. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

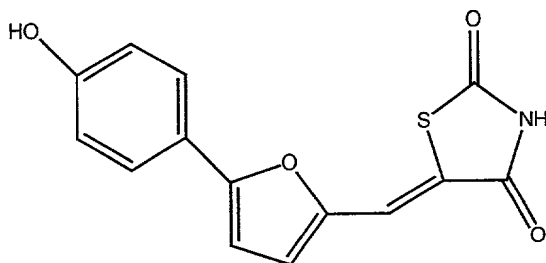


95. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



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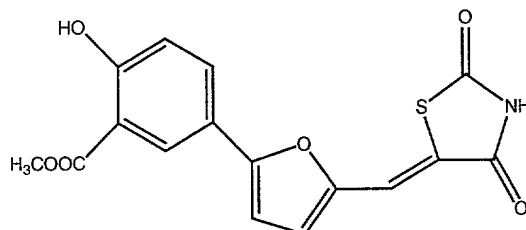
96. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



10

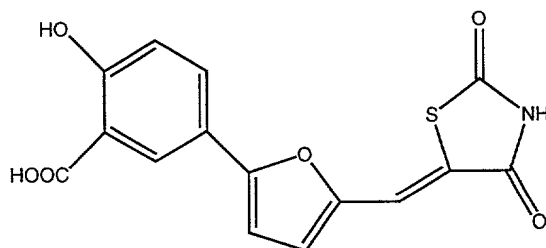
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97. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



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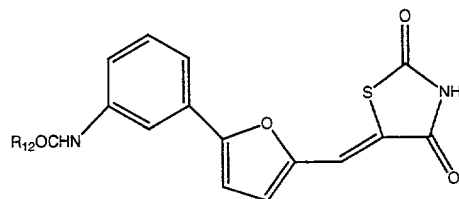
98. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



10

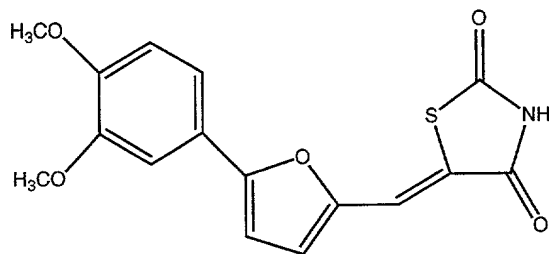
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99. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

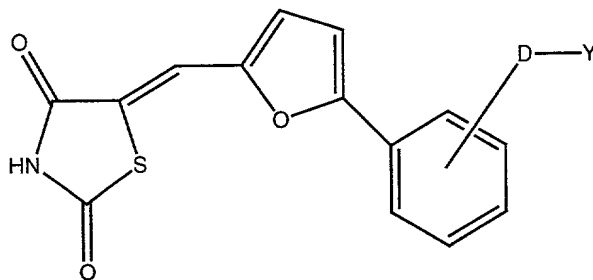


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100. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



101. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

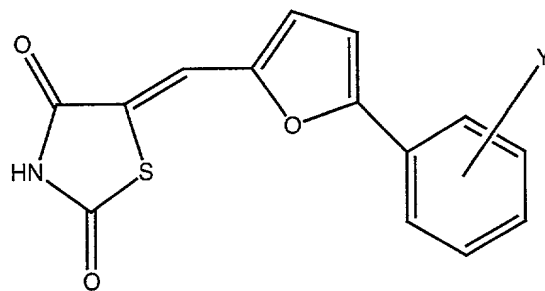


wherein

D is alkylene, alkenylene, alkynylene, aryl, or heterocycle; and

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

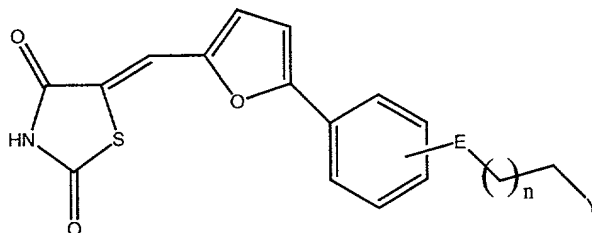
102. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

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103. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



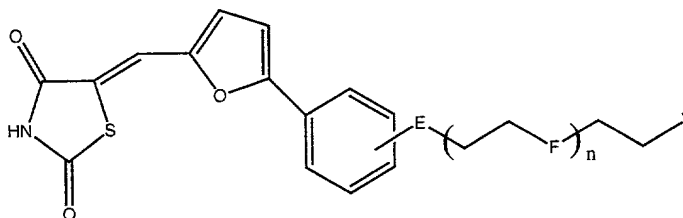
wherein

E is O, S, NR_{12} , $CR_{11}C_{12}$, $CONR_{12}$, SO_2NR_{12} , $NR_{11}CONR_{12}$, $NR_{11}CNHNR_{12}$, $NR_{12}COO$, $C\equiv C$, or $CH=CH$;

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , $CONH_2$, $CONHR_{12}$, $C\equiv CH$, or $CH=CH_2$; and

n is an integer between 0 and 5, inclusive.

104. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein

E and F each independently are selected from the group consisting of O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂,

NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, and CH=CH;

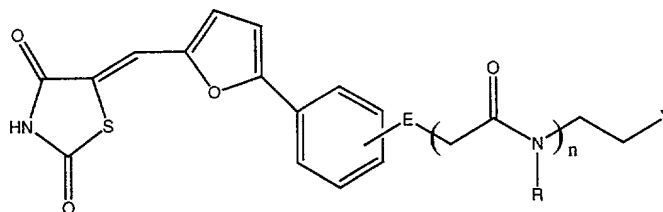
Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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105. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

5



wherein

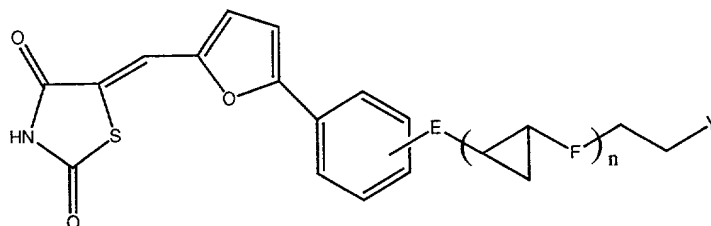
E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

10 Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂;

R is hydrogen, alkyl, alkenyl, alkynyl, aryl, or heterocycle; and

n is an integer between 0 and 5, inclusive.

5



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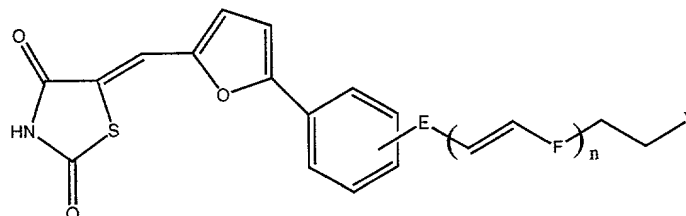
$$\text{NR}_{11}\text{CONR}_{12}, \text{NR}_{11}\text{CNHNR}_{12}, \text{NR}_{12}\text{COO}, \text{C}\equiv\text{C}, \text{ and } \text{CH}=\text{CH};$$

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

107. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

5



wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

10 F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

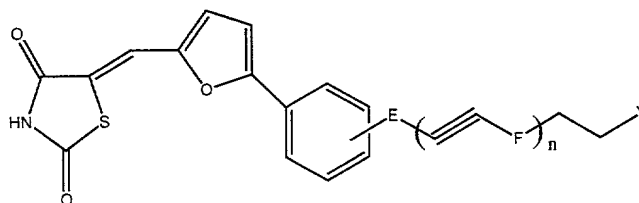
Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

15 n is an integer between 0 and 5, inclusive.

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108. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

5



wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

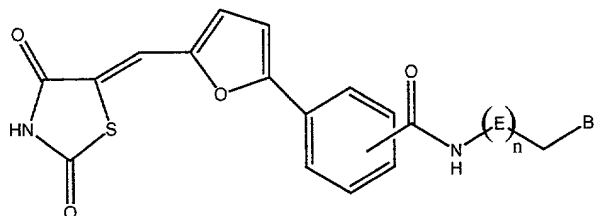
10 F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

15 n is an integer between 0 and 5, inclusive.

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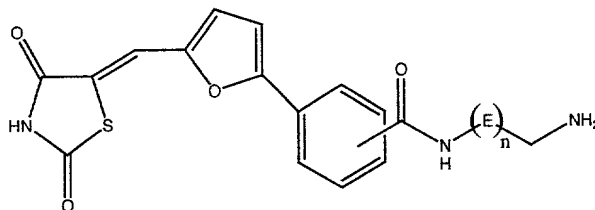


10

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHN₁₂, NR₁₂COO, C≡C, or CH=CH; and

n is an integer between 0 and 5, inclusive.

110. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein

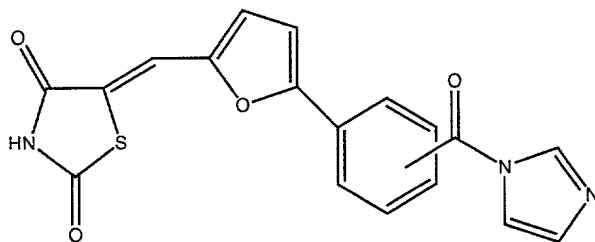
E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH; and

n is an integer between 0 and 5, inclusive.

111. The combinatorial library of claim 110, wherein n is greater than 4 and E is CH₂CH₂OCH or CH₂CH₂SCH.

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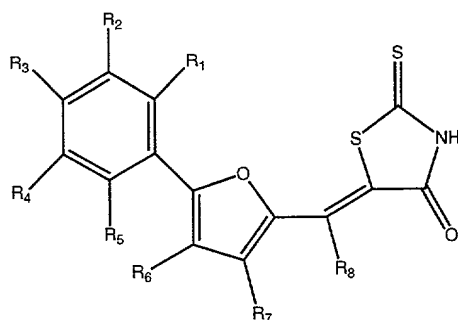
112. The combinatorial library of claim 88, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



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113. A combinatorial library of two or more compounds comprising a common ligand variant of a compound of formula:



wherein

R₁ to R₈ each independently are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, heterocycle, COOH, COOalkyl, CONR₁₀R₁₁, C(O)R₁₂, OH, Oalkyl, OAc, SH, SR₁₂, SO₃H, S(O)R₁₂, SO₂NR₁₀R₁₁, S(O)₂R₁₂, NH₂, NHR₁₂, NR₁₀R₁₁, NHCOR₁₂, N₃, NO₂, PH₃, PH₂R₁₂, H₂PO₄, H₂PO₃, H₂PO₂, HPO₄R₁₂, PO₂R₁₁R₁₂, CN, and X;

R₁₀, R₁₁, and R₁₂ each independently are selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, and heterocycle, or R₁₀ and R₁₁ together with the nitrogen to which they are attached can be joined to form a heterocyclic ring.

114. The combinatorial library of claim 113, wherein at least one of R₁ to R₈ is COOH.

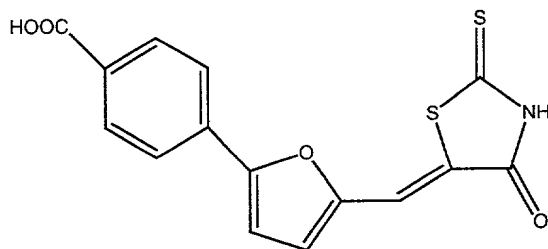
115. The combinatorial library of claim 113, wherein at least one of R_1 to R_8 is OH.

116. The combinatorial library of claim 113, wherein at least one of R_1 to R_8 is OAlkyl.

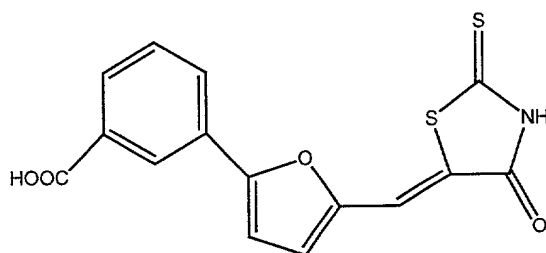
5 117. The combinatorial library of claim 113, wherein at least one of R_1 to R_8 is COOAlkyl.

118. The combinatorial library of claim 113, wherein at least one of R_1 to R_8 is NHCOR₇.

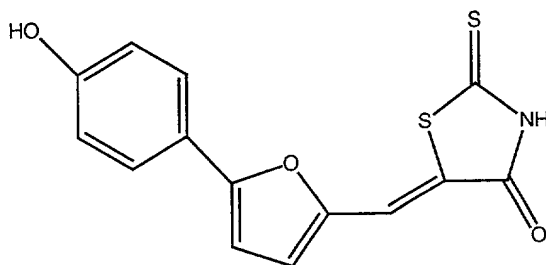
10 119. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:



120. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

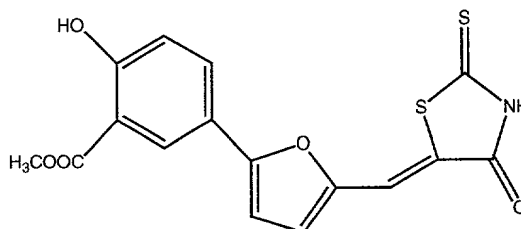


121. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

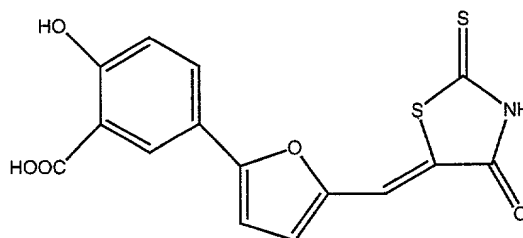


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122. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

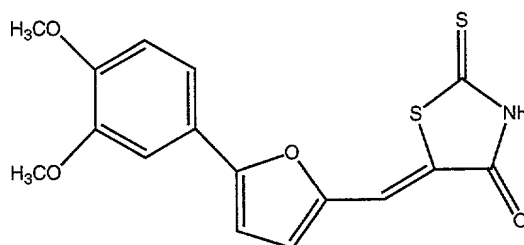


123. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

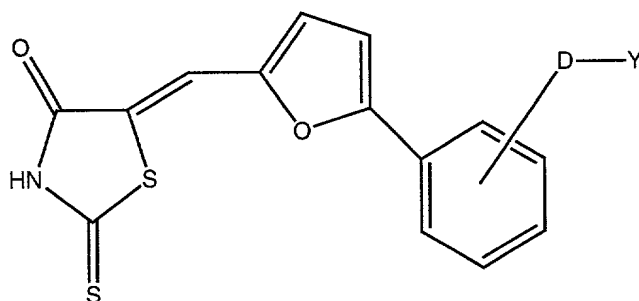


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124. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:



125. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:



wherein

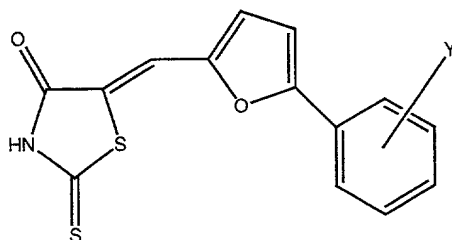
D is alkylene, alkenylene, alkynylene, aryl, or
10 heterocycle; and

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
C≡CH, or CH=CH₂.

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126. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

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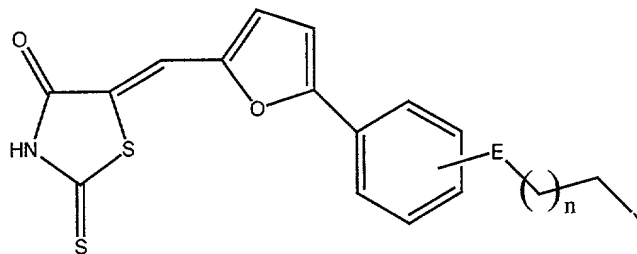
wherein

wherein Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONH_2 , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

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127. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

E is O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$,
 10 $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, or $\text{CH}=\text{CH}$;

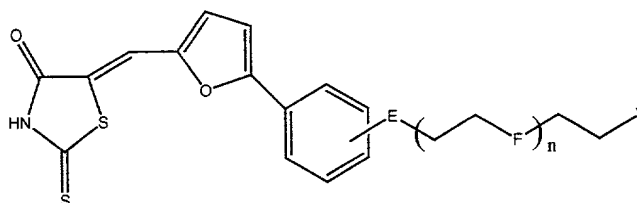
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONH_2 ,
 $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

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128. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

E and F each independently are selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, and $\text{CH}=\text{CH}$;

10

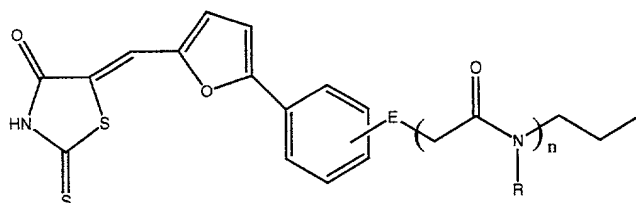
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONH_2 , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

Accepted for publication

129. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

E is O, S, NR_{12} , $CR_{11}C_{12}$, $CONR_{12}$, SO_2NR_{12} , $NR_{11}CONR_{12}$, $NR_{11}CNHNR_{12}$, $NR_{12}COO$, $C\equiv C$, or $CH=CH$;

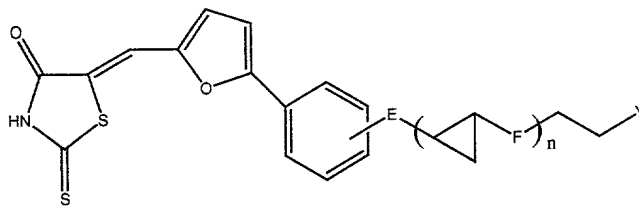
10 Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , $CONH_2$, $CONH_2$, $C\equiv CH$, or $CH=CH_2$;

R is hydrogen, alkyl, alkenyl, alkynyl, aryl, or heterocycle; and

n is an integer between 0 and 5, inclusive.

130. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

E and F each independently are selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, and $\text{CH}=\text{CH}$;

10

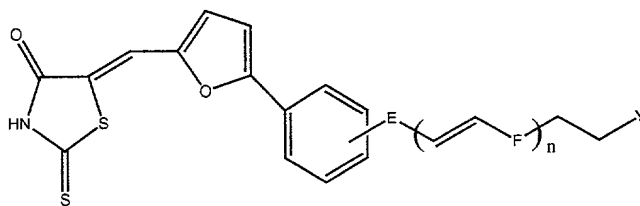
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONH_2 , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

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131. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

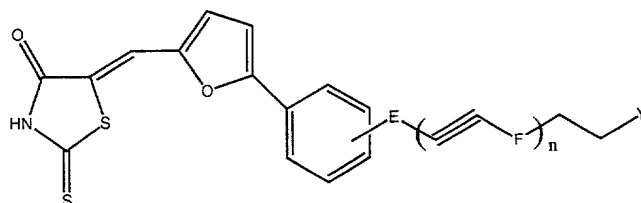
10 F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONH₂, C≡CH, or CH=CH₂; and

15 n is an integer between 0 and 5, inclusive.

132. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

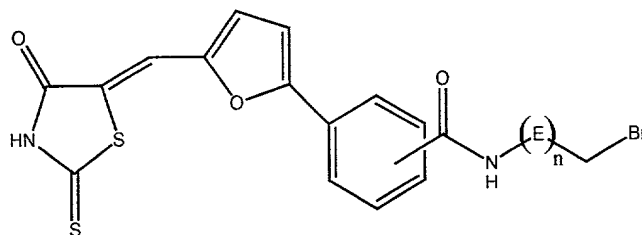
E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

10 F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONH₂, C≡CH, or CH=CH₂; and

15 n is an integer between 0 and 5, inclusive.

133. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

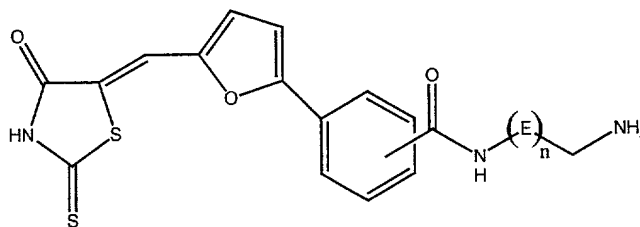


wherein

E is O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, or $\text{CH}=\text{CH}$; and

n is an integer between 0 and 5, inclusive.

134. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

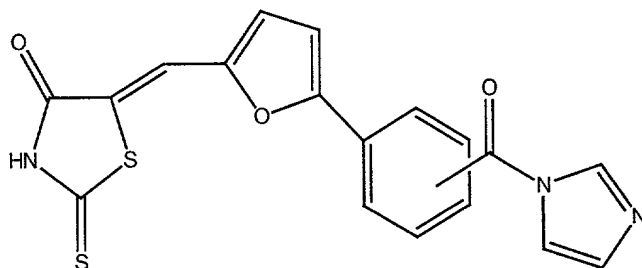


wherein

E is CH_2 , $\text{CH}_2\text{CH}_2\text{OCH}$ or $\text{CH}_2\text{CH}_2\text{SCH}$ and n is an integer between 1 and 10, inclusive.

135. The combinatorial library of claim 134, wherein n is greater than 4 and E is $\text{CH}_2\text{CH}_2\text{OCH}$ or $\text{CH}_2\text{CH}_2\text{SCH}$.

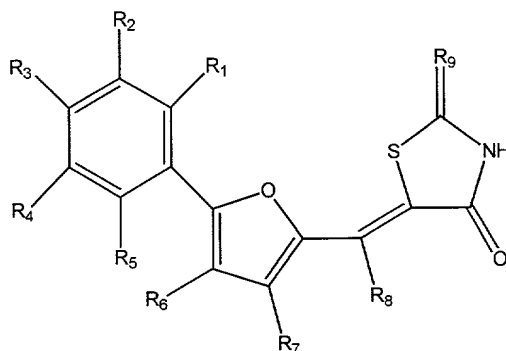
136. The combinatorial library of claim 113, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:



10

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137. A combinatorial library of two or more bi-ligands comprising the reaction product of a specificity ligand and a common ligand mimic having the formula:



wherein

R₁ to R₈ each independently are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, heterocycle, COOH, COOalkyl, CONR₁₀R₁₁, C(O)R₁₂, OH, Oalkyl, OAc, SH, SR₁₂, SO₃H, S(O)R₁₂, SO₂NR₁₀R₁₁, S(O)₂R₁₂, NH₂, NHR₁₂, NR₁₀R₁₁, NHCOR₁₂, N₃, NO₂, PH₃, PH₂R₁₂, H₂PO₄, H₂PO₃, H₂PO₂, HPO₄R₁₂, PO₂R₁₁R₁₂, CN, and X;

R₉ is O, S, or NR₁₂; and

R₁₀, R₁₁, and R₁₂ each independently are selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, and heterocycle, or R₁₀ and R₁₁ together with the nitrogen to which they are attached can be joined to form a heterocyclic ring.

138. The combinatorial library of claim 137, wherein at least one of R₁ to R₈ is COOH.

139. The combinatorial library of claim 137, wherein at least one of R_1 to R_8 is OH.

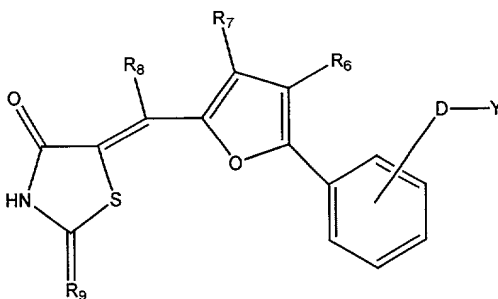
140. The combinatorial library of claim 137, wherein at least one of R_1 to R_8 is OAlkyl.

5 141. The combinatorial library of claim 137, wherein at least one of R_1 to R_8 is COOAlkyl.

142. The combinatorial library of claim 137, wherein at least one of R_1 to R_8 is NHCOR₇.

10 143. The combinatorial library of claim 137, wherein two or more of R_1 to R_8 are substituted.

144. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



15

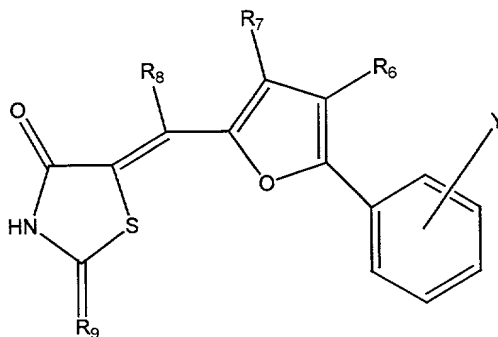
wherein

D is alkylene, alkenylene, alkynylene, aryl, or heterocycle; and

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Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

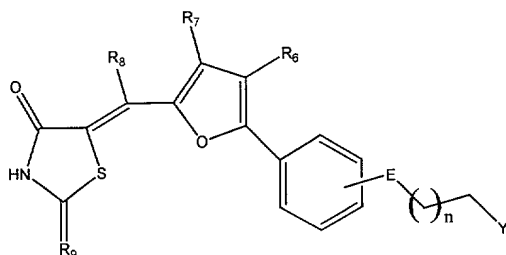
145. The combinatorial library of claim 137, wherein at least one of the compounds is a common
5 ligand variant of a compound having the formula:



wherein Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 ,
10 CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

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146. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

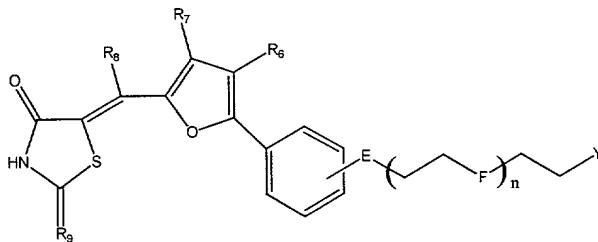
Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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147. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

5



wherein

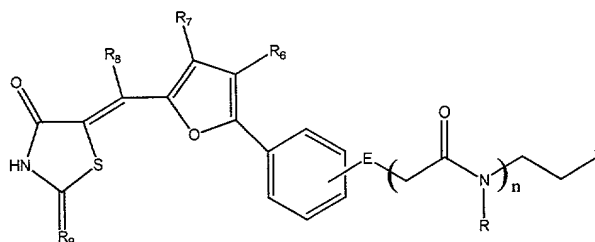
E and F each independently are selected from the group consisting of O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, and CH=CH;

10

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

148. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein

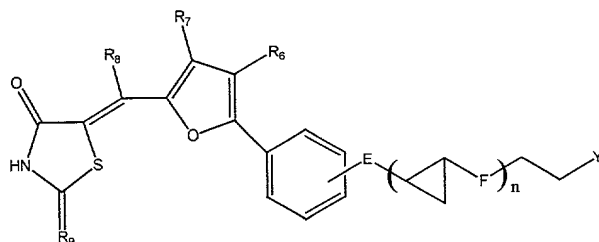
E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂;

R is hydrogen, alkyl, alkenyl, alkynyl, aryl, or heterocycle; and

n is an integer between 0 and 5, inclusive.

149. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein

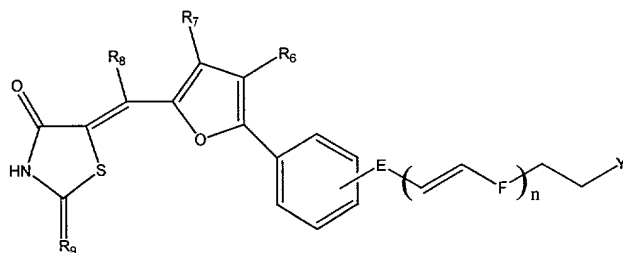
E and F each independently are selected from the group consisting of O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂,

NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

150. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

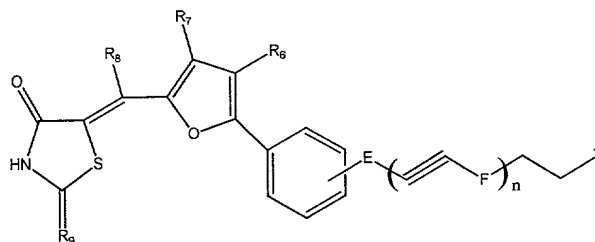
F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

151. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

5



wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

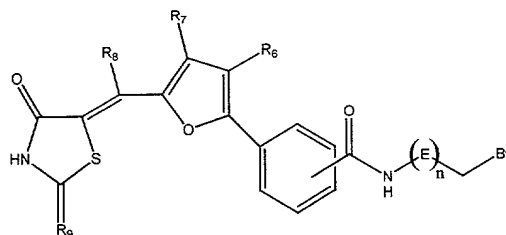
10 F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

15 n is an integer between 0 and 5, inclusive.

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152. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

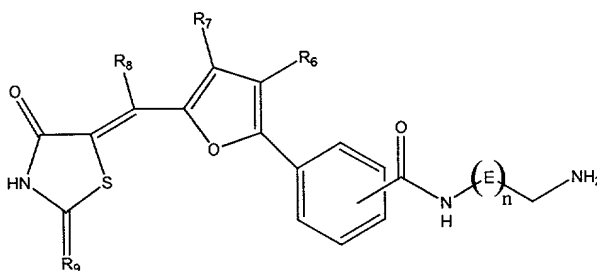


wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH; and

n is an integer between 0 and 5, inclusive.

153. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

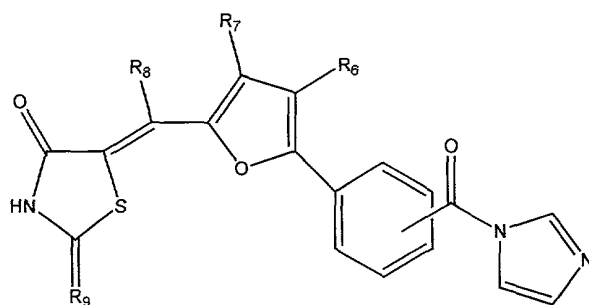


wherein

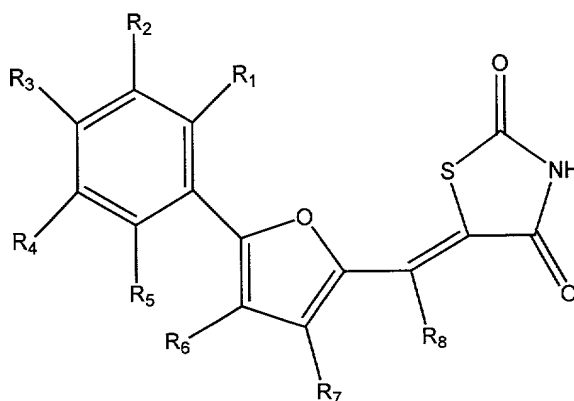
E is CH₂, CH₂CH₂OCH or CH₂CH₂SCH and n is an integer between 1 and 10, inclusive.

154. The combinatorial library of claim 153, wherein n is greater than 4 and E is $\text{CH}_2\text{CH}_2\text{OCH}$ or $\text{CH}_2\text{CH}_2\text{SCH}$.

155. The combinatorial library of claim 137, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



156. A combinatorial library of two or more bi-ligands comprising the reaction product of a specificity ligand and a common ligand mimic having the formula:



wherein

- 10 R_1 to R_8 each independently are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, heterocycle, COOH, COOAlkyl, CONR₁₀R₁₁, C(O)R₁₂, OH, OAlkyl, OAc, SH, SR₁₂, SO₃H, S(O)R₁₂, SO₂NR₁₀R₁₁, S(O)₂R₁₂, NH₂, NHR₁₂, NR₁₀R₁₁, NHCOR₁₂, N₃, NO₂, PH₃, PH₂R₁₂, H₂PO₄,
15 H₂PO₃, H₂PO₂, HPO₄R₁₂, PO₂R₁₁R₁₂, CN, and X;

R_{10} , R_{11} , and R_{12} each independently are selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, and heterocycle, or R_{10} and R_{11} together with the nitrogen to which they are attached can be joined to form
20 a heterocyclic ring.

157. The combinatorial library of claim 156, wherein at least one of R_1 to R_8 COOH.

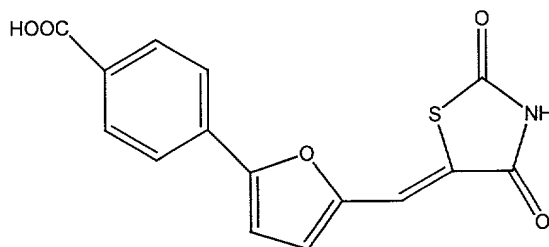
158. The combinatorial library of claim 156, wherein at least one of R_1 to R_8 is OH.

5 159. The combinatorial library of claim 156, wherein at least one of R_1 to R_8 is COOAlkyl.

160. The combinatorial library of claim 156, wherein at least one of R_1 to R_8 is OAlkyl.

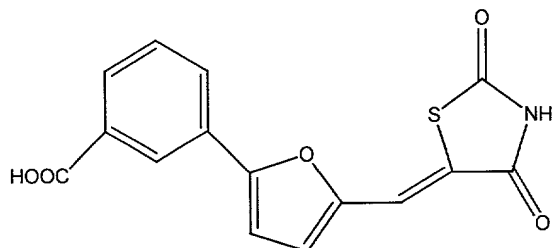
10 161. The combinatorial library of claim 156, wherein two or more of R_1 to R_8 are substituted.

162. The combinatorial library of claim 156, wherein the common ligand mimic comprises a compound of the formula:



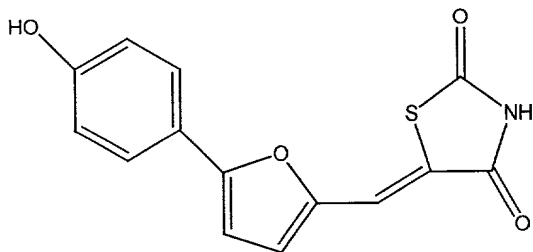
15

163. The combinatorial library of claim 156, wherein the common ligand mimic comprises a compound of the formula:



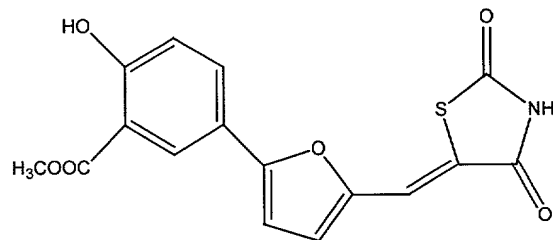
5

164. The combinatorial library of claim 156, wherein the common ligand mimic comprises a compound of the formula:



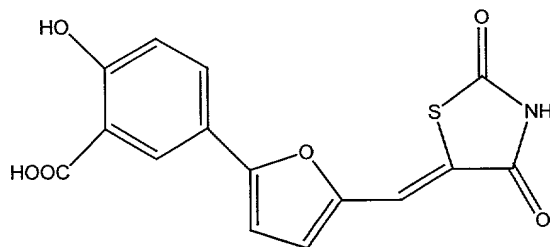
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165. The combinatorial library of claim 156, wherein the common ligand mimic comprises a compound of the formula:



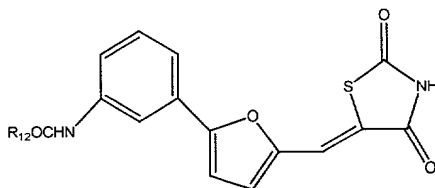
5

166. The combinatorial library of claim 156, wherein the common ligand mimic comprises a compound of the formula:



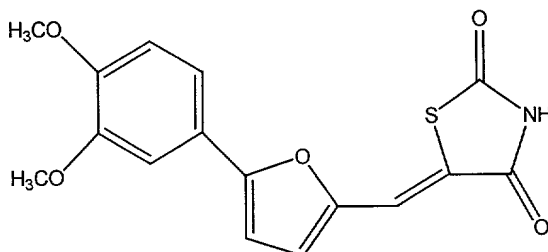
10

167. The combinatorial library of claim 156, wherein the common ligand mimic comprises a compound of the formula:



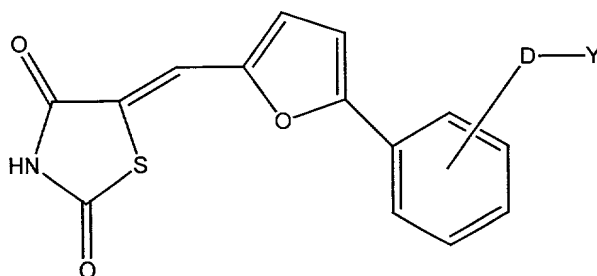
15

168. The combinatorial library of claim 156, wherein the common ligand mimic comprises a compound of the formula:



5

169. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



10

wherein

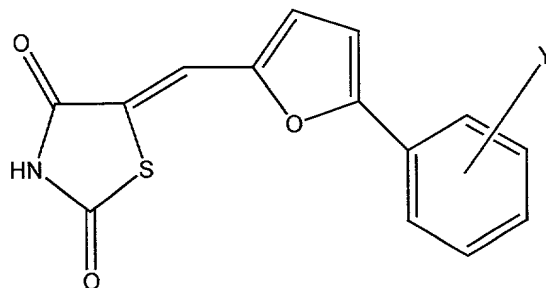
D is alkylene, alkenylene, alkynylene, aryl, or heterocycle; and

15

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

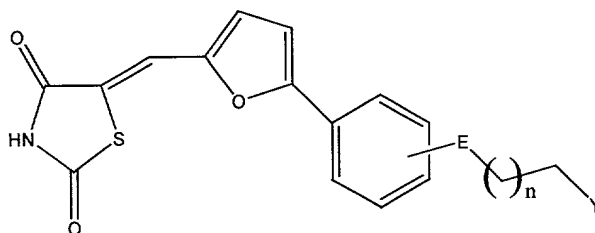
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170. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

171. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



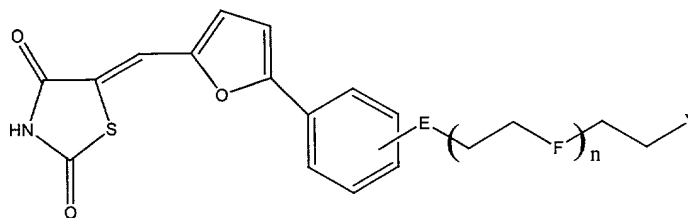
wherein

E is O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, or $\text{CH}=\text{CH}$;

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

172. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein

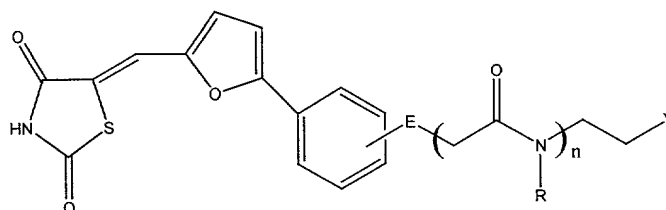
E and F each independently are selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, and $\text{CH}=\text{CH}$;

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

173. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

5



wherein

10

E and F each independently are selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, and $\text{CH}=\text{CH}$;

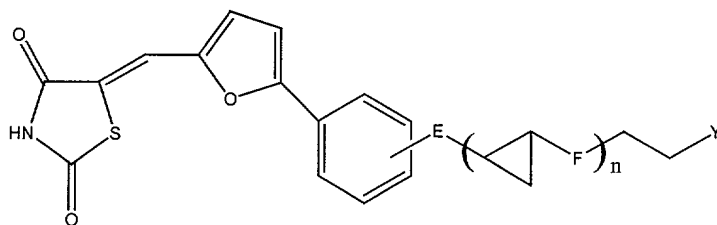
R is hydrogen, alkyl, alkenyl, alkynyl, aryl, or heterocycle; and

n is an integer between 0 and 5, inclusive.

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174. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

5



wherein

E and F each independently are selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, and $\text{CH}=\text{CH}$;

10

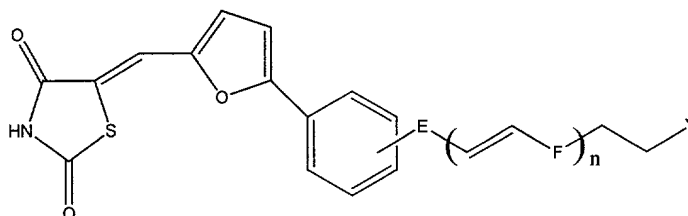
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

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175. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

5



wherein

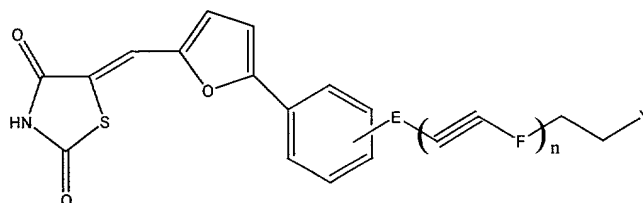
E is O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, or $\text{CH}=\text{CH}$;

10 F independently is selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{R}_{12}$, CONR_{12} , $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}=\text{C}$, and $\text{CH}=\text{CH}$;

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

15 n is an integer between 0 and 5, inclusive.

5



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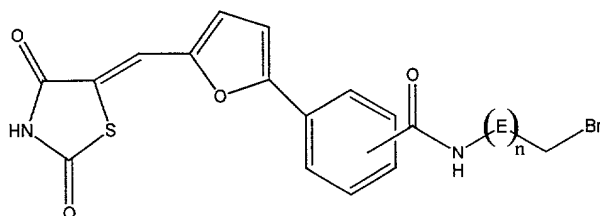
F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNr₁₂, NR₁₂COO, C=C, and CH=CH;

15

n is an integer between 0 and 5, inclusive.

177. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:

5



wherein

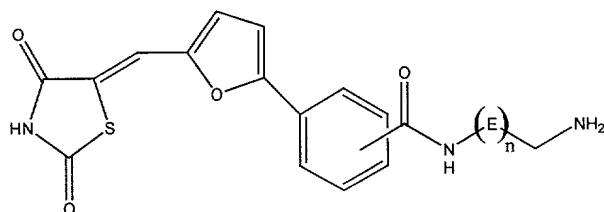
E is O , S , NR_{12} , $CR_{11}C_{12}$, $CONR_{12}$, SO_2NR_{12} , $NR_{11}CONR_{12}$, $NR_{11}CNHNR_{12}$, $NR_{12}COO$, $C\equiv C$, and $CH=CH$;

10 and

n is an integer between 0 and 5, inclusive.

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178. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



wherein

E is O , S , NR_{12} , $CR_{11}C_{12}$, $CONR_{12}$, SO_2NR_{12} , $NR_{11}CONR_{12}$, $NR_{11}CNHNR_{12}$, $NR_{12}COO$, $C\equiv C$, or $CH=CH$;

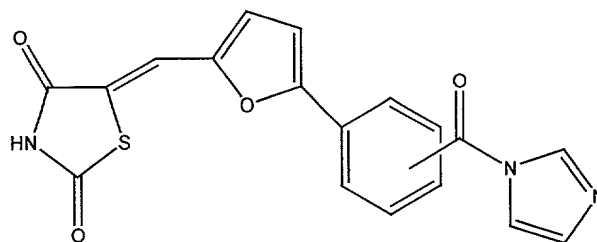
F independently is selected from the group consisting of O , S , NR_{12} , $CR_{11}R_{12}$, $CONR_{12}$, $NR_{11}CONR_{12}$, $NR_{12}COO$, $C=C$, and $CH=CH$;

Y is OH , NHR_{12} , SH , $COOH$, SO_2OH , X , CN , N_3 , $CONH_2$, $CONHR_{12}$, $C\equiv CH$, or $CH=CH_2$; and

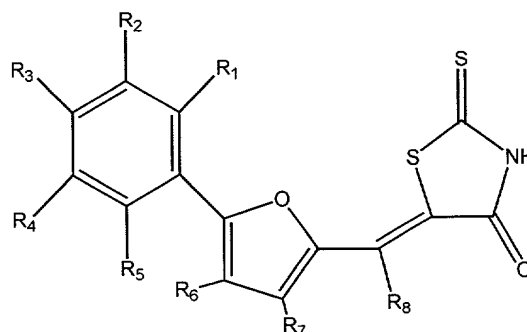
n is an integer between 0 and 5, inclusive.

179. The combinatorial library of claim 178, wherein n is greater than 4 and E is CH_2CH_2OCH or CH_2CH_2SCH .

180. The combinatorial library of claim 156, wherein at least one of the compounds is a common ligand variant of a compound having the formula:



181. A combinatorial library of two or more bi-ligands comprising the reaction product of a specificity ligand and a common ligand mimic having the formula:



wherein

R_1 to R_8 each independently are selected from the group consisting of H, alkyl, alkenyl, alkynyl, aryl, heterocycle, COOH, COOAlkyl, CONR₁₀R₁₁, C(O)R₁₂, OH, OAlkyl, OAc, SH, SR₁₂, SO₃H, S(O)R₁₂, SO₂NR₁₀R₁₁, S(O)₂R₁₂, NH₂, NHR₁₂, NR₁₀R₁₁, NHCOR₁₂, N₃, NO₂, PH₃, PH₂R₁₂, H₂PO₄, H₂PO₃, H₂PO₂, HPO₄R₁₂, PO₂R₁₁R₁₂, CN, and X;

R_{10} , R_{11} , and R_{12} each independently are selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, and heterocycle, or R_{10} and R_{11} together with the nitrogen to which they are attached can be joined to form a heterocyclic ring.

182. The combinatorial library of claim 181, wherein at least one of R_1 to R_8 is COOH.

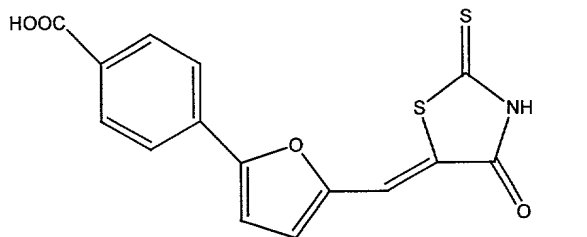
183. The combinatorial library of claim 181, wherein at least one of R_1 to R_8 is OH.

184. The combinatorial library of claim 181, wherein at least one of R_1 to R_8 is OAlkyl.

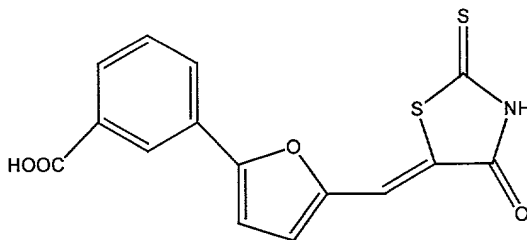
5 185. The combinatorial library of claim 181, wherein at least one of R_1 to R_8 is COOAlkyl.

186. The combinatorial library of claim 181, wherein at least one of R_1 to R_8 is NHCOR₇.

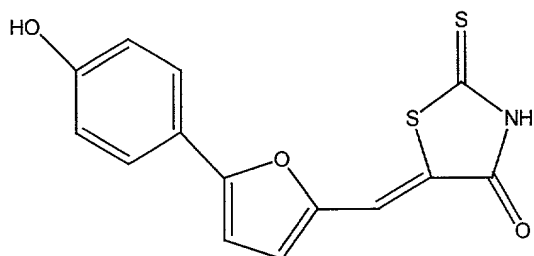
10 187. The combinatorial library of claim 181, wherein the common ligand mimic comprises a compound of the formula:



15 188. The combinatorial library of claim 181, wherein the common ligand mimic comprises a compound of the formula:

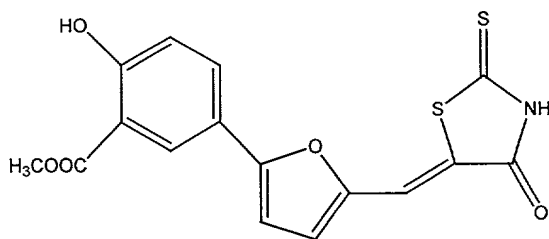


189. The combinatorial library of claim 181, wherein the common ligand mimic comprises a compound of the formula:



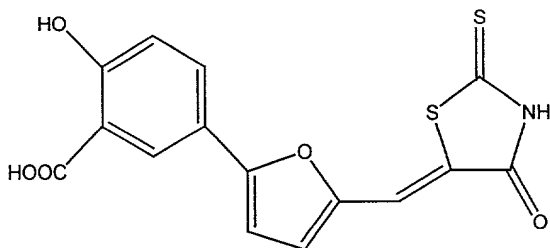
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190. The combinatorial library of claim 181, wherein the common ligand mimic comprises a compound of the formula:



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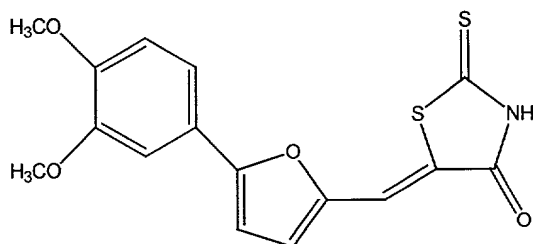
191. The combinatorial library of claim 181, wherein the common ligand mimic comprises a compound of the formula:



15

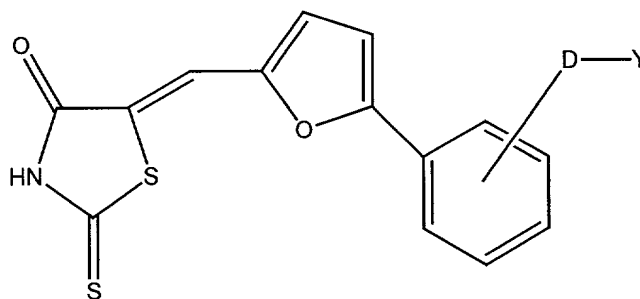
192. The combinatorial library of claim 181, wherein the common ligand mimic comprises a compound of the formula:

5



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193. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:



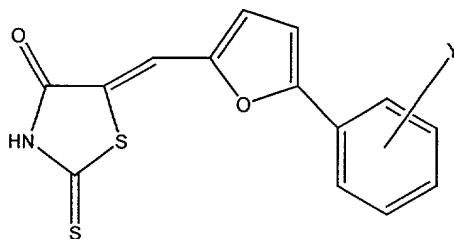
15 wherein

D is alkylene, alenylene, alkynylene, aryl, or heterocycle; and

Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

194. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5

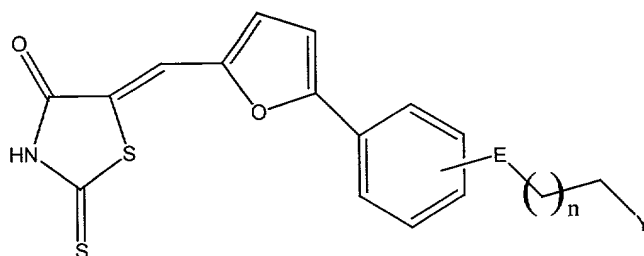


wherein

wherein Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 ,
10 CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$.

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5



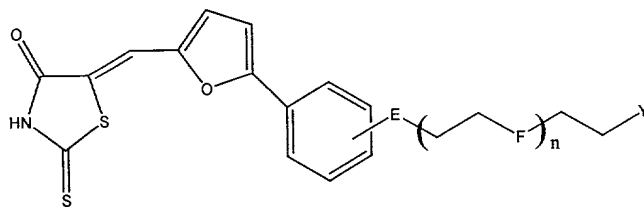
10

Y is OH, NHR_{12} , SH, COOH , SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

196. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

E and F each independently are selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, and $\text{CH}=\text{CH}$;

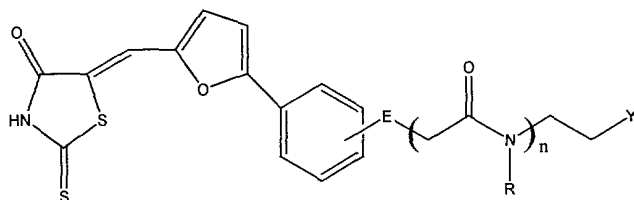
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

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2012-02-02

197. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂,
 10 NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂,
 C≡CH, or CH=CH₂;

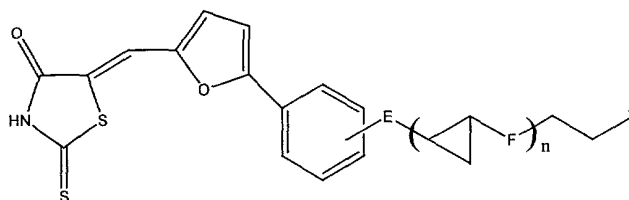
R is hydrogen, alkyl, alkenyl, alkynyl, aryl, or
 heterocycle; and

15 n is an integer between 0 and 5, inclusive.

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198. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

10

E and F each independently are selected from the group consisting of O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$, $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, and $\text{CH}=\text{CH}$;

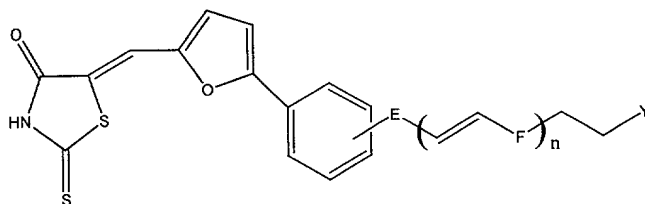
Y is OH, NHR_{12} , SH, COOH, SO_2OH , X, CN, N_3 , CONH_2 , CONHR_{12} , $\text{C}\equiv\text{CH}$, or $\text{CH}=\text{CH}_2$; and

n is an integer between 0 and 5, inclusive.

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199. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

10 E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

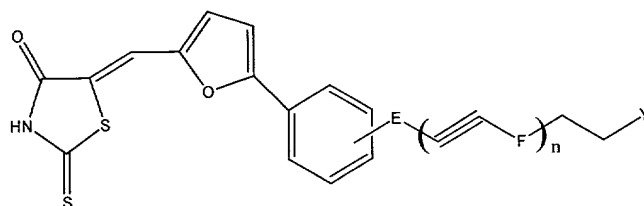
F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

15 Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

200. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

10 E is O, S, NR₁₂, CR₁₁C₁₂, CONR₁₂, SO₂NR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C≡C, or CH=CH;

F independently is selected from the group consisting of O, S, NR₁₂, CR₁₁R₁₂, CONR₁₂, NR₁₁CONR₁₂, NR₁₁CNHNHNR₁₂, NR₁₂COO, C=C, and CH=CH;

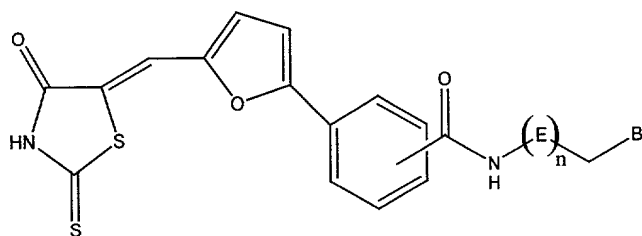
15 Y is OH, NHR₁₂, SH, COOH, SO₂OH, X, CN, N₃, CONH₂, CONHR₁₂, C≡CH, or CH=CH₂; and

n is an integer between 0 and 5, inclusive.

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201. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

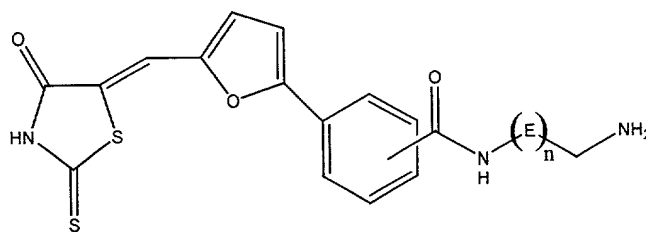
E is O, S, NR_{12} , $\text{CR}_{11}\text{C}_{12}$, CONR_{12} , $\text{SO}_2\text{NR}_{12}$, $\text{NR}_{11}\text{CONR}_{12}$,
 10 $\text{NR}_{11}\text{CNHNR}_{12}$, NR_{12}COO , $\text{C}\equiv\text{C}$, or $\text{CH}=\text{CH}$; and

n is an integer between 0 and 5, inclusive.

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202. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

5



wherein

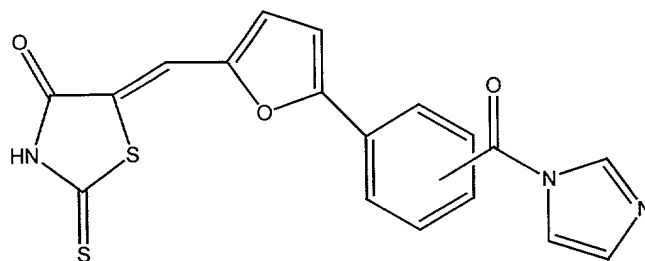
E is CH₂, CH₂CH₂OCH or CH₂CH₂SCH and n is an integer between 1 and 10, inclusive.

10

203. The combinatorial library of claim 202, wherein n is greater than 4 and E is CH₂CH₂OCH or CH₂CH₂SCH.

204. The combinatorial library of claim 181, wherein at least one of the compounds in the library is a common ligand variant of a compound having the formula:

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